

**SUBSCRIBER LINE, LINE LINK AND CONTROLLER AND
SUBSCRIBER SENDER LINK AND CONTROLLER
CROSS CONNECTIONS
NO. 1 CROSSBAR OFFICES**

1. GENERAL

1.01 This section describes the method of changing subscriber line, line link and controller (SD-25003-01 and SD-25553-01) and subscriber sender link and controller (SD-25004-01 and SD-25554-01) cross connections in connection with changes in the treatment or routing of calls. Information is also included in this section regarding the functions of the various cross connections.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 Information for placing solderless wrapped straps and cross connections and detailed requirements for placing and removing solderless wrapped connections are covered in Sections 069-133-801 and 069-132-811, respectively.

2. APPARATUS

2.01 Soldering tools and materials as required.

2.02 Bell System pliers as required.

2.03 Material and tools for placing and removing solderless wrapped connections (See 1.03).

2.04 The following wire as required:

No. 22 Gauge Bare Strap Wire (P-314952)

No. 22 Gauge Type J Sleeved Strap Wire
(P-26991)

No. 24 Gauge Bare Strap Wire (for solderless wrapped connections)

No. 24 Gauge Type BU Strap Wire (for solderless wrapped connections)

3. WIRING

3.01 No. 22 or 24 gauge bare strap wire (see 2.04) shall be used to connect adjacent punchings in the same vertical or horizontal row on the same terminal strip, providing that this strapping does not interfere with existing or future cross connections.

3.02 No. 22 or 24 gauge insulated strap wire (see 2.04) shall be used to connect non-adjacent punchings in the same vertical row and to connecting punchings in different vertical rows. When connecting punchings in different vertical rows, the sleeved strap wire shall be run through the fanning strip allowing enough slack to facilitate tracing.

4. DESCRIPTIONS AND CROSS CONNECTIONS

Class of Service — Line Link Frame SD-25003-01

4.01 Each line link frame is arranged for a maximum of six classes of service. The classes of service are individual to each frame and may vary from frame to frame. Subscriber lines requiring the same class of service are placed in like-numbered vertical files on a line link frame so that the LT-relay operated by the line is an indication of the class of service required by that line. The L0 to L9 leads to class of service contacts of the LT0 to LT9 relays are wired to punchings 50 to 59, respectively, on the miscellaneous terminal strip located at the top of the frame. The CS0 to CS4 leads from the DF relay are wired to punchings 40 to 44 (20 to 24 on early installations) on the terminal strip located between the secondary switches and the CS0 to CS9 leads from the sender link frame are wired to punchings 12 to 21, respectively on the same terminal strip. On later installations, line link frames are equipped with CS0 to CS3 relays to increase the number of classes of service (up to a maximum of 12 or 24) available to any one frame.

4.02 When more than one vertical file requires the same class of service, the respective L punchings are strapped together and cross-connected to the assigned CS punching. If a class of service is to be added or changed for a file of lines which was not previously provided at the line link frame, make the required cross connections to provide the class of service at the terminal strip located between the secondary switches.

4.03 After changing the class of service of a vertical file, all vertical files involved in the operation should be verified for the correct class of service.

4.04 *Where Senders Are Equipped for Five Classes of Service:* Senders require a class of service indication on one of the CS0 to CS4 leads from a line link frame. Cross-connect punchings L0 to L9 (50 to 59) to punchings CS0 to CS4 (61, 63, 65, 67, 69 respectively) as required on the miscellaneous terminal strip at the top of the frame.

**At Miscellaneous Terminal Strip
Top of Basic Unit**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
L0	50	CS0	61
L1	51	CS1	63
L2	52	CS2	65
L3	53	CS3	67
L4	54	CS4	69
L5	55		
L6	56		
L7	57		
L8	58		
L9	59		

4.05 *Where Senders Are Equipped for Six Classes of Service:* Senders require a class of service indication on one of the CS0 to CS5 leads from a line link frame. Cross-connect punchings L0 to L9 (50 to 59) to punchings CS0 to CS4 (61, 63, 65, 67, 69, respectively) as required at the miscellaneous terminal strip at the top of the frame. On the terminal strip located between the secondary switches, punchings CS0

to CS5 (12 to 17) are cross-connected to punchings CS0 to CS4 (40 to 44) as required, to add or change a class of service.

**At Miscellaneous Terminal Strip
Top of Basic Unit**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
L0	50	CS0	61
L1	51	CS1	63
L2	52	CS2	65
L3	53	CS3	67
L4	54	CS4	69
L5	55		
L6	56		
L7	57		
L8	58		
L9	59		

**At Terminal Strip Between
Secondary Switches**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
CS0	12	CS0	40
CS1	13	CS1	41
CS2	14	CS2	42
CS3	15	CS3	43
CS4	16	CS4	44
CS5	17		

4.06 *Where Senders are Equipped for 12 Classes of Service and Line Link Frames are Not Equipped with CS0 to CS3 Relays:* Senders require a class of service indication on one of the CS0 to CS5 leads and on only one of the CS6 or CS7 leads from a line link frame. Cross-connect punchings L0 to L9 (50 to 59) to punchings CS0 to CS3 (61, 63, 65, 67, respectively) as required at the miscellaneous terminal strip at the top of the frame. On the terminal strip located between the secondary switches, punchings CS0 to CS5 (12 to 17) are cross-connected to the proper CS0 to CS3 punchings (40 to 43) and the CS6 punching (18) or the CS7 punching (19) is cross-connected to the CS4 punching (44) as required to add or change a class of service.

**At Miscellaneous Terminal Strip
Top of Basic Unit**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
L0	50	CS0	61
L1	51	CS1	63
L2	52	CS2	65
L3	53	CS3	67
L4	54		
L5	55		
L6	56		
L7	57		
L8	58		
L9	59		

**At Terminal Strip Between
Secondary Switches**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
CS0	12	CS0	40
CS1	13	CS1	41
CS2	14	CS2	42
CS3	15	CS3	43
CS4	16		
CS5	17		

Cross-Connect as Required

CS6	18	CS4	44
CS7	19		

4.07 Where Senders are Equipped for 24 Classes of Service and Line Link Frames are Not Equipped with CS0 to CS3 Relays: Senders require a class of service indication on one of the CS0 to CS5 leads and also on the same CS6 to CS9 leads from a line link frame. Cross-connect the L0 to L9 punchings (50 to 59) to the CS0 to CS3 punchings (61, 63, 65, 67, respectively) as required at the miscellaneous terminal strip at the top of the frame. At the terminal strip located between the secondary switches, the CS0 to CS5 punchings (12 to 17) are cross-connected to the CS0 to CS3 punchings (40 to 43) and one of the CS6 to CS9 punchings (18 to 21) is cross-connected to CS4 punching (44) as required, to add or change a class of service.

**At Miscellaneous Terminal Strip
Top of Basic Unit**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
L0	50	CS0	61
L1	51	CS1	63
L2	52	CS2	65
L3	53	CS3	67
L4	54		
L5	55		
L6	56		
L7	57		
L8	58		
L9	59		

**At Terminal Strip Between
Secondary Switches**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
CS0	12	CS0	40
CS1	13	CS1	41
CS2	14	CS2	42
CS3	15	CS3	43
CS4	16		
CS5	17		

Cross-Connect as Required

CS6	18	CS4	44
CS7	19		
CS8	20		
CS9	21		

4.08 Where Senders Are Equipped for 12 Classes of Service And Line Link Frames Are Equipped With CS0 to CS3 Relays: Senders require a class of service indication on one of the CS0 to CS5 leads and on either of the CS6 and CS7 leads from a line link frame. Cross-connect the L0 to L9 punchings (50 to 59) to the CS0 to CS3 punchings (61, 63, 65, 67, respectively) and cross-connect CS0 to CS3 punchings (130 to 133) to CS6 and CS7 punchings (120 to 121, respectively) as required on the miscellaneous terminal strip at the top of the frame. Punchings 50 to 59 represent the LT-relays, punchings 61, 63, 65, 67, represent the windings of the CS0-CS3 relays, punchings 130 to 133 represent the contacts of the CS0-CS3 relays, punchings 120 and 121 represent contacts on the DF relays. At the terminal strip located between the secondary switches, the CS0 to CS5 punch-

ings (12 to 17) are cross-connected to the CS0 to CS3 punchings (40 to 43) and the CS6 punching (18) or the CS7 punching (19) is cross-connected to the CS4 punching (44) as required to add or change a class of service.

**At Miscellaneous Terminal Strip
Top of Basic Unit**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
L0	50	CS0	61
L1	51	CS1	63
L2	52	CS2	65
L3	53	CS3	67
L4	54		
L5	55		
L6	56		
L7	57		
L8	58		
L9	59		

Cross-Connect as Required

CS0	130	CS6	120
CS1	131	CS7	121
CS2	132		
CS3	133		

**At Terminal Strip Between
Secondary Switches**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
CS0	12	CS0	40
CS1	13	CS1	41
CS2	14	CS2	42
CS3	15	CS3	43
CS4	16		
CS5	17		

Cross-Connect as Required

CS6	18	CS4	44
CS7	19		

**4.09 Where Senders Are Equipped for 24
Classes of Service and Line Link Frames**

Are Equipped With CS0 to CS3 Relays: Senders require a class of service indication on one of the CS0 to CS5 leads and on any of the CS6 to CS9 leads from a line link frame. Cross-connect the L0 to L9 punchings (50 to 59) to the CS0 to CS3 punchings (61, 63, 65, 67, respectively) and

cross-connect the CS0 to CS3 punchings (150, 157 [formerly 151], 152, 153, respectively) to the CS6 to CS9 punchings (140 to 143) as required at the miscellaneous terminal strip at the top of the frame. Punchings 50 to 59 represent the LT relays, punchings 61, 63, 65, 67 represent the windings of the CS0 to CS3 relays, respectively. Punchings 150, 157 (formerly 151), 152, 153 represent the contacts of the CS0 to CS3 relays, and punchings 140 to 143 represent contacts on the DF relays. At the terminal strip between the secondary switches, the CS0 to CS5 punchings (12 to 17) are cross-connected to the CS0 to CS3 punchings (40 to 43) as required, to add or change a class of service.

**At Miscellaneous Terminal Strip
Top of Basic Unit**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
L0	50	CS0	61
L1	51	CS1	63
L2	52	CS2	65
L3	53	CS3	67
L4	54		
L5	55		
L6	56		
L7	57		
L8	58		
L9	59		

Cross-Connect as Required

CS0	150	CS6	140
CS1	157	CS7	141
CS2	152	CS8	142
CS3	153	CS9	143

**At Terminal Strip Between
Secondary Switches**

Cross-Connect as Required

From		To	
Lead	Pchg	Lead	Pchg
CS0	12	CS0	40
CS1	13	CS1	41
CS2	14	CS2	42
CS3	15	CS3	43
CS4	16		
CS5	17		

Class of Service — Line Link Frame SD-25553-01

4.10 Each line link frame is arranged for a maximum of six classes of service. The classes of service are individual to each frame and may vary from frame to frame. Subscriber lines requiring the same class of service are placed in like-numbered vertical files on a line link frame so that the LT-relay operated by the line is an indication of the class of service required by that line. At the CS terminal strip ten punchings L0 to L9 are cross-connected to six punchings CR0 to CR5 which in turn operate class of service relays CS0 to CS5. The cross-connection of grounded relay contact leads CA0 to CA5, CB0 to CB5, CC0 to CC5 to ten CS leads or eight S leads depends on the type of signal required by the sender. The punching designation and corresponding punching number on the CS terminal strip are as follows:

Punching Designations	Punchings at CS Terminal Strip
L0 to L9	0 to 9
CR0 to CR5	10 to 15
CA0 to CA5	20 to 25
CB0 to CB5	40 to 45
CC0 to CC5	27 to 29 47 to 49
CS0 to CS9	30 to 39
SA to SE	30 to 34
S0 to S2	35 to 37

4.11 When more than one vertical file requires the same class of service, the respective L punchings are strapped together and cross-connected to the assigned CR punching.

4.12 After changing the class of service of a vertical file, all vertical files involved in the operation should be verified for the correct class of service.

4.13 *Where Senders Are Equipped for 6 Classes of Service:* Senders require ground on one lead (CS0 to CS5), giving a maximum of six classes of service per originating unit served by the same senders. Cross-connect punchings L0 to L9 to CR0 to CR5 and CA0 to CA5 to CS0 to CS5 as required.

4.14 *Where Senders Are Equipped for 6 up to 24 Classes of Service:* Senders require ground on two leads (one CS0 to CS5 and one of the CS6 to CS9 leads), giving a maximum of 24 classes of service per originating unit served by the same senders. Cross-connect punchings L0 to L9 to CR0 to CR5, CA0 to CA5 to CS0 to CS5, and CB0 to CB5 to CS6 to CS9 as required.

4.15 *Where Senders Are Equipped for 30 Classes of Service:* Senders require ground on three leads (two SA to SE and one of the S0 to S2 leads), giving a maximum of thirty classes of service per originating unit served by the same senders. Cross-connect punchings L0 to L9 to CR0 to CR5, CA0 to CA5 to SA to SE, CB0 to CB5 to other SA to SE punchings grounding a possible two out of five leads for a possible maximum of ten indications, and CC0 to CC5 to S0 to S2, as required.

District Junctor Preference (Line Link Frame SD-25003-01 and SD-25553-01)

4.16 District juncctors are arranged in groups of twenty. These groups are further divided into two groups of ten each. Circuit arrangements provide for a change of preference on every other call so that first one group of ten district juncctors is preferred and then another group of ten district juncctors in a different group of twenty district juncctors. Due to wear of the apparatus, it may be desirable to change this group preference a few times during the life of the office, so that different groups of district juncctors are preferred. This is done by changing the cross connections at the punchings in the miscellaneous terminal strip located at the top of the frame.

Note: Where a traffic usage recorder per SD-95738-01 is provided, the district junctor group preference should always be wired to 0 and 2 or 5 and 7. As the TUR frame is wired in all cases to line link secondary switches 0 and 5, wiring the preference in this manner enables the recorder to measure usage on line links which are selected on service calls in the same relative order of preference, that is, first and sixth choice.

4.17 The KA, KB, XA, XB, DA, DB, FA, and FB leads are wired permanently to punchings 20 to 27, respectively (170 to 177 where a mate controller unit is mounted on the miscellaneous frame). The preferred district junctor group is obtained by cross-connecting these punchings to the punchings specified in the district junctor group table shown in Fig. 1 corresponding to the desired group. In this table the punching number is shown below the lead designation. (The punching numbers in parentheses are for use only on the terminal strip on the mate controller where the mate controller unit is mounted on the miscellaneous frame.) For example, if the district junctor group preference

is to be changed from 0 and 2 to 4 and 6, remove the straps between punchings 20 and 27 and punchings 0, 2, 10, 12, 30, 32, 40, and 42. Then strap punchings 20 to 27 to punchings 4, 6, 14, 16, 34, 36, 44, and 46, respectively. Where a change in the preference is made, a corresponding change must also be made at each line link

frame including the mate controller circuit mounted on the miscellaneous frame (when provided) and also in terminating marker as outlined in Division 216 section covering terminating marker cross connections so that the terminating traffic will use the line links in the same order as the originating traffic.

District Junctor Group Preference								
Groups Preferred	Cross Connect							
	KA 20 (170)	KB 21 (171)	XA 22 (172)	XB 23 (173)	DA 24 (174)	DB 25 (175)	FA 26 (176)	FB 27 (177)
0-2	K0 0 (160)	K2 2 (162)	X0 10 (200)	X2 12 (202)	D0 30 (180)	D2 32 (182)	F0 40 (220)	F2 42 (222)
1-3	K1 1 (161)	K3 3 (163)	X1 11 (201)	X3 13 (203)	D1 31 (181)	D3 33 (183)	F1 41 (221)	F3 43 (223)
2-4	K2 2 (162)	K4 4 (164)	X2 12 (202)	X4 14 (204)	D2 32 (182)	D4 34 (184)	F2 42 (222)	F4 44 (224)
3-5	K3 3 (163)	K5 5 (165)	X3 13 (203)	X5 15 (205)	D3 33 (183)	D5 35 (185)	F3 43 (223)	F5 45 (225)
4-6	K4 4 (164)	K6 6 (166)	X4 14 (204)	X6 16 (206)	D4 34 (184)	D6 36 (186)	F4 44 (224)	F6 46 (226)
5-7	K5 5 (165)	K7 7 (167)	X5 15 (205)	X7 17 (207)	D5 35 (185)	D7 37 (187)	F5 45 (225)	F7 47 (227)
6-8	K6 6 (166)	K8 8 (168)	X6 16 (206)	X8 18 (208)	D6 36 (186)	D8 38 (188)	F6 46 (226)	F8 48 (228)
7-9	K7 7 (167)	K9 9 (169)	X7 17 (207)	X9 19 (209)	D7 37 (187)	D9 39 (189)	F7 47 (227)	F9 49 (229)
8-0	K8 8 (168)	K0 0 (160)	X8 18 (208)	X0 10 (200)	D8 38 (188)	D0 30 (180)	F8 48 (228)	F0 40 (220)
9-1	K9 9 (169)	K1 1 (161)	X9 19 (209)	X1 11 (201)	D9 39 (189)	D1 31 (181)	F9 49 (229)	F1 41 (221)

Fig. 1

Sender Link Frames (SD-25004-01 and SD-25554-01)

4.18 Sender Subgroup Preference: Circuit arrangements provide for the preference of a group of ten senders for each group of twenty district junctors. Due to the wear of the apparatus with a fixed preference group it may be desirable to change this sender group preference a few times during the life of the office. The sender group preference leads SG0 to SG9 are wired to punchings 10 to 19 respectively on the miscellaneous terminal strip located at the top of the frame. The district junctor group leads G0 to G4 are wired to punchings 0 to 4 respectively on the same terminal strip. For the emergency controller unit located on the miscellaneous frame, the SG0 to SG9 leads are wired to punchings 210 to 219 and the G0 to G4 leads are wired to punchings 200 to 204. Preference for a particular group of ten senders is given to a group of twenty district junctors by the strapping of the G lead of the district junctor group to the SG lead of the required sender group. On early installations of sender link frame SD-25004-01, SG0 to SG9 leads are wired to punchings 250 to 259, G0 to G4 leads are wired to punchings 240 to 244.

4.19 To change the sender preference, first transfer the sender link frame to the emergency controller circuit in the approved manner and the strap punchings 0 to 4 for the particular group of 20 district junctors to the punching 10 to 19 assigned to the particular group of ten senders. For example, if district junctor group G0 is strapped to sender preference group 0, and the sender preference is to be changed to 3, remove the strap between punchings 0 and 10 and strap punchings 0 and 13. On sender link frames where the G to SG strapping does not agree with that on the emergency controller, a red lamp cap is used for the EF lamp, indicating that the emergency controller is not to be used with such frames.

4.20 Distribution of District Junctor Test Calls: Where the SGT punchings are provided at the sender link frames, the cross connection of this punching and of the SG0 to SG9 punchings gives the district junctor test frame preference to a subgroup of ten senders. The SGT

lead is wired to punching 5 and to punching 205 at the terminal strip on the emergency controller unit. On early installations of sender link frame SD-25004-01, the SGT lead is wired to punching 245.

4.21 Sender Preference: The preference order of senders within a subgroup is controlled by cross-connecting the SP or PF punching on each sender link frame to one of the P0, P2, P4, P6, P8 punchings. The SP or PF, P0, P2, P4, P6, and P8 punchings are 19, 10, 11, 12, 13 and 14 terminals respectively at the terminal strip on subscriber sender selector circuit located on a miscellaneous frame.

Note: Where originating sender load control is provided, a change in existing sender preference cross connections will have adverse effect on the load control feature. The last sender in the preference order is arranged for load control and therefore a change in cross connections would necessitate equipment wiring changes.

Depending on the particular cross connection, the preference order will be in accordance with one of the following:

P0	P2	P4	P6	P8
0	2	4	6	8
9	1	3	5	7
8	0	2	4	6
7	9	1	3	5
6	8	0	2	4
5	7	9	1	3
4	6	8	0	2
3	5	7	9	1
2	4	6	8	0
1	3	5	7	9

4.22 District Junctor Preference: District junctor preference within a district junctor group of ten is established by cross-connecting the DP punching to one of the five D0 to D4 punchings. The DP and D0 to D4 leads are punchings 65 and 60 to 64, respectively on the

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miscellaneous terminal strip at the top of the sender link frame. On early installations of sender link frame SD-25004, the DP and D0 to D4 leads are punchings 85 and 80 to 84, respectively. On the emergency controller circuit located on the miscellaneous frame, the DP lead (punching 225) is cross-connected to one of the five D0 to D4 leads (punchings 220 to 224). Depending on the particular cross connection, the preference order will be in accordance with one of the following:

D0	D1	D2	D3	D4
0	2	4	6	8
1	3	5	7	9
2	4	6	8	0
3	5	7	9	1
4	6	8	0	2
5	7	9	1	3
6	8	0	2	4
7	9	1	3	5
8	0	2	4	6
9	1	3	5	7